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Camberra



AERO UIDE

EE Canberra B Mk 2/T Mk 4



Canberra

English Electric Canberra B Mk 2/T Mk 4

If it looks right, it is right! Aeroguide 7 illustrates and describes one of the truly classic postwar aircraft, and one that certainly demonstrates the truth of the old adage. Mainstay of RAF Bomber Command during the 1950s, the Canberra has proven to be a machine of great versatility, and although it can no longer be considered a combat aircraft per se, it still performs important duties in the target facilities, photographic reconnaissance and countermeasures training roles. This volume concentrates on Canberras as they appear in Royal Air Force colours today, and limits itself to the B Mk 2 (the first production variant of the aircraft), with lesser coverage of the T Mk 4; additional illustrations of such direct derivatives of the B.2 as are maintained in RAF service are also included, but the upgraded PR Mk 7 and the rather different PR Mk 9 are not covered, although it is hoped that a volume dealing with these versions may be produced in the future.

Owing to the Canberra's size, it has not been possible to arrange 1/72 scale colour plans across a double-page spread, and so 1/96 scale has been selected instead, with a slightly reduced scale for the side-view drawings on page 32. It is also regretted that photographic coverage of the cockpit is not as comprehensive as in previous Aeroguides, but the views that are provided are of Canberras in current service and hence relate directly to the rest of the illustrations in the book.

The production of this title has been ensured only because of the generous co-operation of the officers and airmen at Royal Air Force Wyton, and Linewrights gratefully acknowledges the facilities granted by Gp Capt Nigel Baldwin, Station Commander. Particular mention must also be made of Flt Lt Miles Patterson, Engineering Officer No 231 OCU; Flt Sgt Dave McCandless, No 231 OCU; Sqn Ldr Peter Gilbert, Senior Engineering Officer No 100 Sqn; Sqn Ldr Chris Gilding, Acting OC Engineering Wing; Flt Lt Dave Peaple, OC Canberra Servicing Flight; and WO Bill Newton, CSF. Special thanks go to Sqn Ldr lan Steward, Public Liaison Officer at RAF Wyton, who went to considerable lengths to provide the publishers with the facilities they needed and arranged for many technical questions to be answered. Assistance has also been kindly provided by Alexander Johnston, British Aerospace, Warton; Brian Petty, the Martin-Baker Aircraft Co Ltd; Dick Ward of Modeldecal; and Bryan Philpott. Chris Shepherd, RAF Strike Command HQ, took on the 'groundwork' once again, supporting the project from the beginning and also helping with photographs. Uncredited illustrations are copyright of the publishers.

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Front cover illustration: A Canberra T Mk 4 of No 231 OCU, RAF Wyton, May 1984

Back cover plate: Canberra B Mk 2 in the colours of No 50 Sqn at the time of the Suez Crisis, late 1956 Written, designed and produced by Roger Chesneau and Ray Rimell

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INTRODUCTION

First flown in prototype form in 1949, and still in service in considerable numbers both with the Royal Air Force and with overseas air arms, the Canberra ranks as one of the most successful aircraft programmes of all time. Its longevity has testified to the soundness of its design, whilst at the same time being a product of its great flexibility. Originally produced as a successor to De Havilland's famous light bomber the Mosquito, it has served also as a bomber-intruder, a photographic reconnaissance aircraft, a pilot trainer, a radar trainer, an electronics countermeasures (ECM) trainer, a pilotless drone, a target tug and a test-bed for a host of experimental and trials installations, from rocket engines to meteorological research equipment - with, in most cases, relatively little modification to the basic airframe. At the peak of its service career, in the late 1950s, the Canberra equipped over thirty RAF squadrons.

Longevity and flexibility are important indicators of an aircraft's excellence; hardly less indicative is the measure of its export achievement. and in this respect the Canberra has been outstandingly successful. It has been sold to Australia (built in that country under licence), India, New Zealand, Rhodesia (now Zimbabwe), South Africa, Argentina, Peru and Venezuela, with smaller batches going to France, the Federal Republic of Germany, Sweden, Ecuador and Ethiopia. It was also selected for use by the United States Air Force, and, licencebuilt for US service by the Glenn L Martin Company as the B-57, the Canberra was developed under a separate programme as a nocturnal intruder and high-altitude photographic reconnaissance aircraft.

FIRST JET BOMBER

During World War II, W E W Petter, formerly chief designer at Westland &

General Aircraft, recruited several of the country's leading aircraft technicians and began work on the design of what would become the first British jet bomber, capable of speeds up to about 550 mph and with a range of some 2500 miles. An official Air Ministry specification for a high-speed tactical bomber incorporating radar-aiming – B.3/45 – was issued as the design evolved, and Petter's team was ready to respond to this in late 1945. Four B Mk 1 prototypes were ordered in January 1946, and just over three years later, in

Below: Canberra line-up at Warton, mid-1950s, displays five of the early marks: (from left to right) PR Mk 7, B Mk 6, T Mk 4, PR Mk 3 and B Mk 2. Each is finished in silver overall, with the exception of the PR.3 which carries the early photo-reconnaissance scheme of Medium Sea Grey uppersurfaces and PR Blue undersurfaces. *British Aerospace*



May 1949, the English Electric A.1 (as the company designated the new aircraft) took to the air for the first time. Production was ordered under a revised specification, B.5/47 (mainly to meet the requirement for a visual bombing capability, the radar equipment originally proposed having met unexpected snags), and the B Mk 2 was test-flown in April 1950 and began to enter RAF service a year later at Binbrook, the first unit formed being No 101 Squadron. The second unit to fly Canberras was No 231 Operational Conversion Unit (OCU) at Bassingbourn in late 1951; No 231 OCU is still operating the aircraft today, although it is now based at Wyton. Thereafter, Canberra squadrons began to proliferate, and as the 'V-bombers' came into service from the late 1950s aircraft were transferred overseas to form new units in RAF Germany and in the Middle East and Far East Air Forces. For a period in the late 1950s Canberras were operated as tactical nuclear hombers.

EXTRA ALTITUDE

The high-speed and high-altitude capabilities of the Canberra more or

less guaranteed that it would make an ideal vehicle for the photographic reconnaissance role, and it is a measure of the aircraft's virtues that a 14in extension to the forward fuse-lage – to accommodate cameras, flares and extra fuel – was the only basic alteration required for the change of task. The PR Mk 3 was followed by the Mk 7, which introduced the uprated engines (Avon Mk 109 instead of Mk 1) and wing fuel tanks that had been developed for the B Mk 6, successor to the Mk 2.

More drastic design revision although still confined to the forward fuselage - resulted in the B(I) Mk 8, which utilised the ventral gun pack and underwing stores stations introduced on some Mk 6s to fit them for the low-level interdiction role but also featured a completely redesigned nose and an offset opening canopy. This layout was in essence retained for the next (and final) PR variant, the Mk 9, which also showed modified wings of increased chord and 4ft greater span, enabling it to gain extra altitude, believed to be of the order of 10,000ft over the 50,000ft-plus attained by earlier marks.

Subsequent marks of Canberra were many and varied, but all could trace their origins to B Mk 2/T Mk 4/B Mk 6/B Mk 8 roots, many aircraft being direct rebuilds from existing airframes of earlier marks. Many of the aircraft supplied to overseas air forces have been refurbished from stocks surplus to RAF requirements as Canberras were gradually phased out from front-line operations.

CANBERRAS IN ACTION

Quite apart from B-57 activities conducted by the United States Air Force during the Vietnam War, Canberras have seen action over the past three decades in a number of theatres. They were, for example, used by the RAF during the Suez Crisis of 1956, B Mk 2s of No 10 Squadron based in Cyprus opening the offensive against Egyptian airfields, and Canberras were also flown on a number of occasions when trouble flared in Malaya during the mid-1950s. Australian B Mk (generally similar to the RAF's Mk 2s) saw action in concert with USAF B-57s in Vietnam, No 2 Squadron serving in that conflict from 1967 to 1971, whilst Indian Canberras and Pakistani B-57s







were used in anger against targets in each other's countries during the 1967 and 1971 Wars. More recently, Canberras were in prominence when used against British forces, for in the 1982 Falklands War an Argentine B Mk 62, one of a flight of three engaged on a bombing sortie against British ships, was hit by a Sidewinder missile fired from a Royal Navy Sea Harrier (see Aeroguide 3) and came to grief.

A VITAL ROLE

All Royal Air Force Canberras are today based at RAF Wyton, which is 'home' for Nos 100 and 360 Squadrons, No 1 Photographic Reconnaissance Unit (1 PRU) and, of course, No 231 OCU. A number of different marks are still operated – the B Mk 2 (No 100 Sqn, No 231 OCU), B Mk 2T and T Mk 4 (No 231 OCU), PR Mk 7 (No 100 Sqn), PR Mk 9 (1 PRU), E Mk 15 (No 100 Sqn), T Mk 17 (No 360 Sqn) and TT Mk 18 (No 100 Sqn). The E.15 is a developed B.6, whilst the T.17 and TT.18 are both converted B.2 airframes, the former variant serving as an ECM trainer and the latter as a target tug.

Although its teeth have been drawn by time, at least in RAF service, the Canberra continues to play a vital role – and there are at the moment no firm plans for its withdrawal. It is not beyond the realms of possibility that, when retirement finally comes, fifty years will have elapsed since the first prototype took to the air.

Opposite page top: The Canberra prototype, VN799, undergoing engine tests prior to its first flight. Note the early configuration of the rudder. *British Aerospace*

Opposite page bottom: An air-to-air shot of VN799. Finish is overall 'Petter' blue. *British Aerospace*

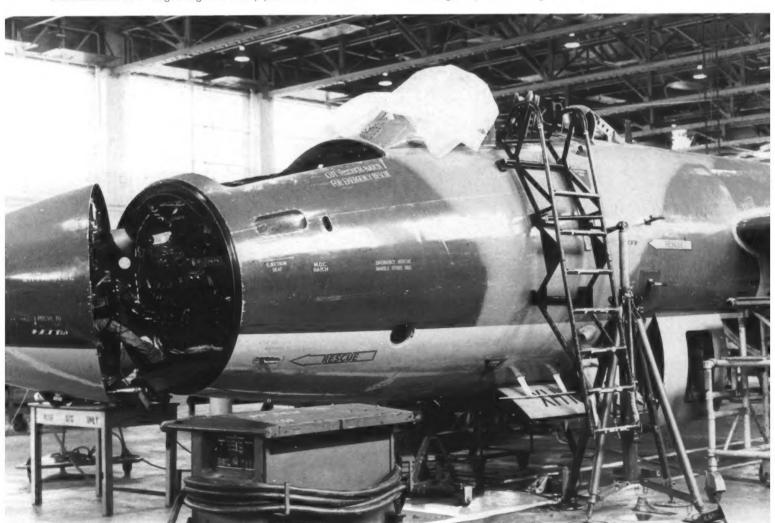
Above: The first prototype B Mk 2, VX165, shows off the Canberra's classic lines during a test flight over the English Electric factory, 1950. *British Aerospace* Below: The T Mk 4 prototype, with air brakes extended. During the 1950s Canberras set a number of point-to-point world speed records and broke the world altitude record on three occasions, underlining the aircraft's capabilities. *British Aerospace*





Above: One of the many 'recycled' Canberra variants is the TT Mk 18, a converted B.2 airframe fitted with Rushton target-towing equipment. High-speed targets are streamed from underwing pods at distances many miles from the parent aircraft. Yellow and black-striped undersurfaces have characterised RAF target tugs for many years. *RAF Official*

Below: The Canberra PR Mk 9 is a specialised variant and still serves with the RAF in very limited numbers. This is XH169, undergoing maintenance at Wyton, May 1984. Just discernible, under wraps, is the offset cockpit; more obvious is the sideways-hingeing nose, affording flight crew access. Note the glossy finish and generally immaculate condition.



AIRFRAME

Below: Nose contours of a Canberra B Mk 2T operated by No 231 OCU. The B.2T's external appearance is virtually indistinguishable from that of the B Mk 2. Crew entry is via the hinged door beneath the canopy, the latter being non-opening. Behind the canopy can be seen the escape hatch for the two rear crew stations. Note the sprayed camouflage demarcations.

Bottom: One of No 231 OCU's Canberra T Mk 4s, showing the two main recognition points of this particular variant, the unglazed nose and the second DV (direct vision) panel on the starboard side of the canopy. The bomb bay doors are open – a pose not untypical of parked aircraft. Note also the angle at which the nose undercarriage doors hang compared with the previous photograph.







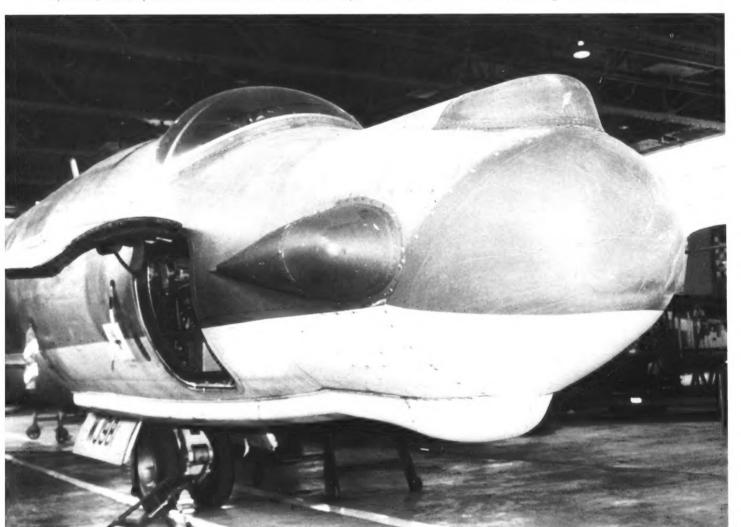
Above: A Canberra T Mk 17 receives careful attention from the Canberra Servicing Flight at RAF Wyton. The T.17 is another variant produced from a B.2 airframe, and is employed as a highly specialised electronics countermeasures (ECM) trainer, providing, for example, 'enemy' radar jamming during UK air defence and other exercises. The T.17 is operated exclusively by No 360 Squadron, whose personnel are drawn from both the Royal

Air Force and the Royal Navy and whose moth-and-trident insignia is clearly visible on the fin of this aircraft.

Below: Nose contours of another T Mk 17, showing the fairings housing some of the aircraft's electronic wizardry.

Opposite page top: B Mk 2 nose transparency and pitot tube. Bomb-aiming flat panel was offset to clear bombsight.

Opposite page bottom: Lower forward fuselage contours of B Mk 2 WE113/BJ, showing stencil detail etc.









Left: B Mk 2 lower forward fuselage, showing non-standard downward-vision window.

Below: Port fuselage detail forward of the wing; note the UHF antenna on the bomb bay door. WE113 is believed to be the oldest Canberra in current RAF service, being part of the initial production batch of seventy aircraft completed in the early 1950s.

Bottom: Three-quarter view of the fuselage of a B.2T, port side. The Dark Sea Grey/Dark Green/Light Aircraft Grey scheme is now standard for Canberras, as are the red/blue roundels, and all variants except the PR.9 are matt finished. Individual patterns show slight variations, as do the upper/lower demarcation contours adjacent to the wing roots. Note belly camera hatch below roundel.











Top: Uppersurface detail of a Canberra T Mk 4; particularly evident are the dorsal UHF antenna and anti-collision beacon. The streaking does not reflect the condition in which these aircraft are maintained – the photograph was taken on a very rainy day!

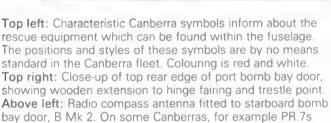
Above: Fuselage detail from the starboard side, showing the ventral anti-collision light. Hoist symbol beneath roundel is yellow, stencilled lettering black.

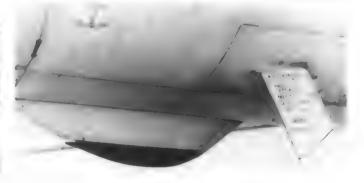
Left: Rear fuselage of a No 231 OCU B Mk 2T, showing the stylish white 'shadowing' to the black code letters on the fin. Survival pack notice (left) is yellow (this instruction is repeated on the starboard side of the fuselage), as is the trestle point symbol below the black serial number. Note camouflage 'wrap-around' beneath tailplane.











and TT.18s, a similar fitting is to be found mounted on the port wing, close to the fuselage.

Above right: Tail bumper from starboard, with vent nearby. Below: Detail of fuselage at port tailplane junction, with part of elevator mechanism visible, T Mk 17.

Opposite page top: General view of rear fuselage (B.2T) Opposite page bottom: Canberra elevators and rudder are horn-balanced, as this view of WE113 shows.









Above: Tail-end of WE113 shows 'see-through' effect beneath tailplane and reinforcing panel below root. **Below:** No 231 OCU Squadron badge – a yellow leopard with red and black detail on a blue-outlined white disc. Fin

antenna is not present on all Canberras.

Opposite page: Vertical tail surfaces, showing rudder clamp and tail navigation light. Note squared-off fairing at tip of rudder and absence of fin antenna on this example







Above: Forward section of starboard engine nacelle, B Mk 2T, fitted with what is presumably replacement panelling from another aircraft. Starter cartridge exhaust outlet is prominent.

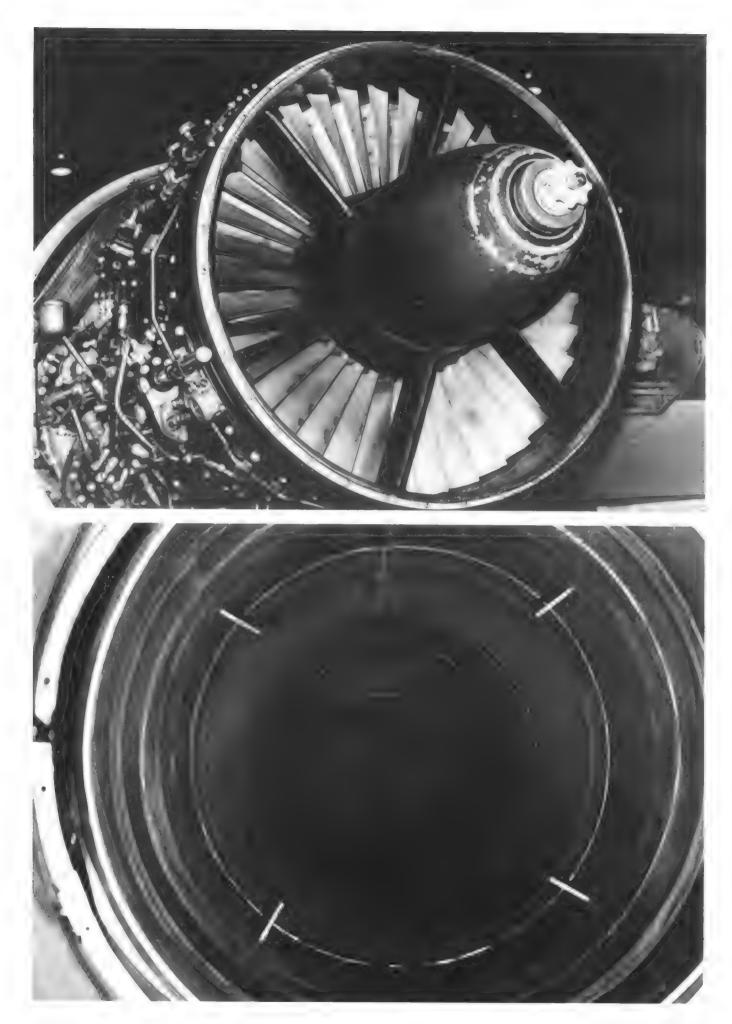
Below: Rear of port nacelle; the outlet pipe is natural metal. Note how the colour demarcation contour matches that of

the fuselage at the wing root beyond.

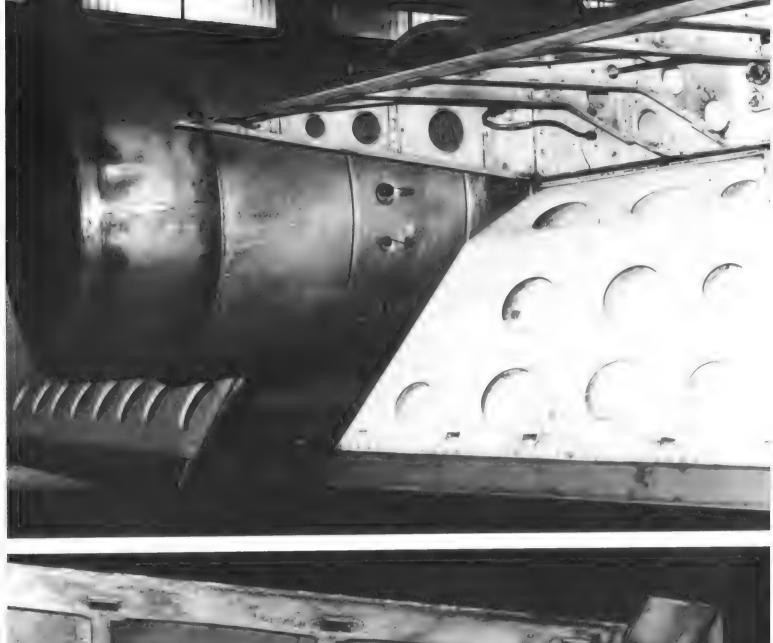
Opposite page top: Front end of an Avon Mk 1 with nacelle panels removed. The starter breech cap is installed in the central fairing.

Opposite page bottom: Interior of jetpipe, showing temperature (JPT) sensors. Colour is metallic brownish-grey.





Page 15







Opposite page top: Starboard jetpipe of a T Mk 17 with panelling removed; note JPT sensor leads. The photograph also shows interior detail of the outboard flap.

Opposite page bottom: Part of the inboard port flap actuating mechanism. Flap inside surfaces are white.

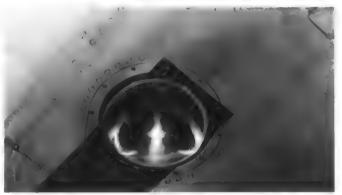


Above left: Underside of starboard wing of B.2T WJ731. Above right: Port wing lower surfaces of the same machine; the wing serial is carried only in this position. Below: Detail view of extended air brakes, starboard side. a T Mk 17 under maintenance affords this rare glimpse









Top: Generator/alternator cooling air intake in wing leading edge, adjacent to fuselage; port wing has a symmetrical fit. Above: Detail view of underwing cooling intake, T.17 only Above right: Adjustable-position landing lamp, beneath port wing. The item at the extreme top right of the photo is one of the underwing 'finger' air brakes. B Mk 2T.

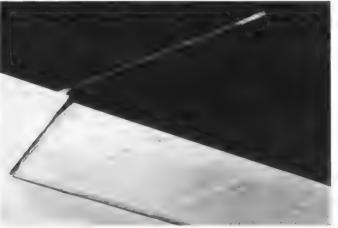
wing. The item at the extreme top right of the photo is one of the underwing 'finger' air brakes. B Mk 2T.

Right: The wingtip pitot tube identifies a Canberra T Mk 17; the shape of the navigation lamp transparency contrasts with that of the PR Mk 9 nearby.

Below: Close-up of starboard wingtip navigation light, with sealant freshly applied. Note attachment point of wing tank. **Below right:** Static discharger, trailing edge of port aileron.







Page 18

UNDERCARRIAGE

Below: Canberra twin nosewheels; note the standard practice of painting the aircraft serial number on the nosewheel doors. Wheel hubs on this machine are silver. Bottom: Nosegear from the starboard side; note picketing

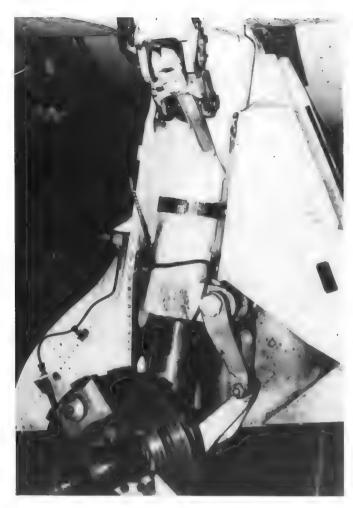
ring in foreground. The striping below the fuselage on the extreme right is associated with a now-obsolete aerial cover; a similar panel is located immediately behind the bomb bay, but on many Canberras neither panel is evident these days







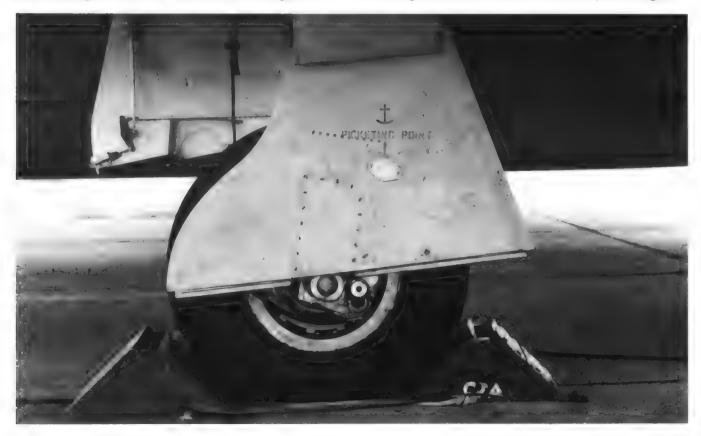








Above left: Inboard view of starboard mainwheel leg, with wheel removed, showing 'cut-out' in door to accommodate oleo linkage. Leg and door interior are semi-gloss white. Above right and below: Two views of the port main gear.

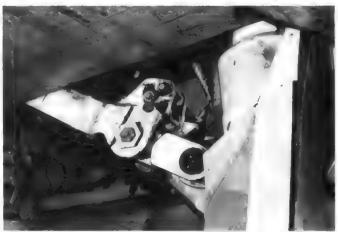


This page: Three views showing details of the port main undercarriage bay. All interior surfaces of the bay, jacks, etc are semi-gloss white, but the oleo sections of the retraction jacks have protective half-covers across the 'leading edges' which are painted red. Compared to more modern aircraft, the wheel bays are simple and uncluttered.

Opposite page: Five photographs depicting the starboard main bay. Most of the cables and pipes visible are black, with metallic clips. Interestingly, the inside surfaces of the small outboard main gear door (photo at top left) are painted yellow. The door locking system, visible particularly on the inboard unit, betrays the age of the aircraft's design.

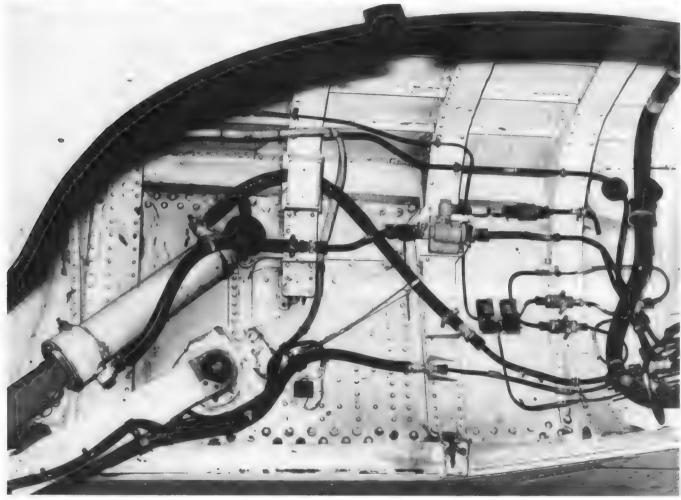
















COCKPIT

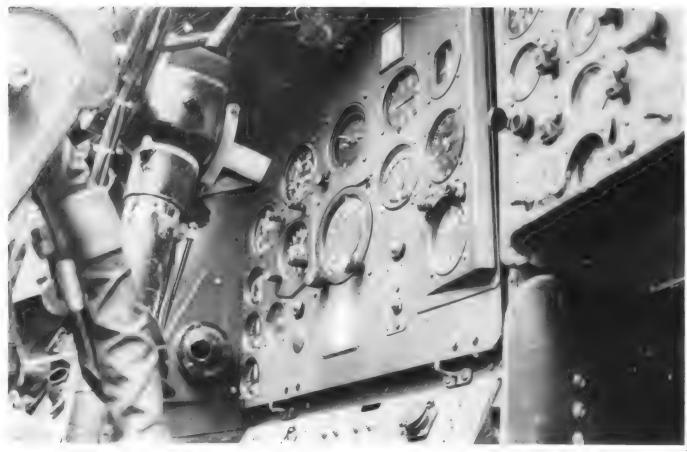
Below: A DV panel on the starboard side of the perspex canopy identifies this Canberra as a T Mk 4. The vertical strip at the centre is for heating; the DV panel also has a heater element. The one-piece, sealed canopy can be jettisoned by means of explosive bolts in the event of an emergency. The fairing at the rear edge is an aerodynamic fit found necessary after prototype testing to cure turbulence.

Bottom: The main instrument panel of a B Mk 2.

Opposite page top left: Canberra ejector seats have been the subject of much development, which is hardly surprising considering the aircraft's long service career. The original equipment was Martin-Baker Mk 1s, but these were subsequently converted to Mk 2s and Mk 3s. This photograph shows the Type 2CA, typically fitted in all three positions in the B Mk 2 and T Mk 17, and in the single rear position in the T Mk 4. *Martin-Baker Aircraft Co Ltd*Opposite page top right: The Type 3CT seat (minus its firing handles), typically fitted in the student's and instructor's positions in the Canberra T Mk 4. *Martin-Baker Aircraft Co Ltd*

Opposite page bottom left: A view into the cockpit of a B Mk 2. The bomb-aimer's couch is visible at lower right. Opposite page bottom right: T Mk 4 cockpit interior; the instructor's seat is fitted to a swinging beam for access aft.









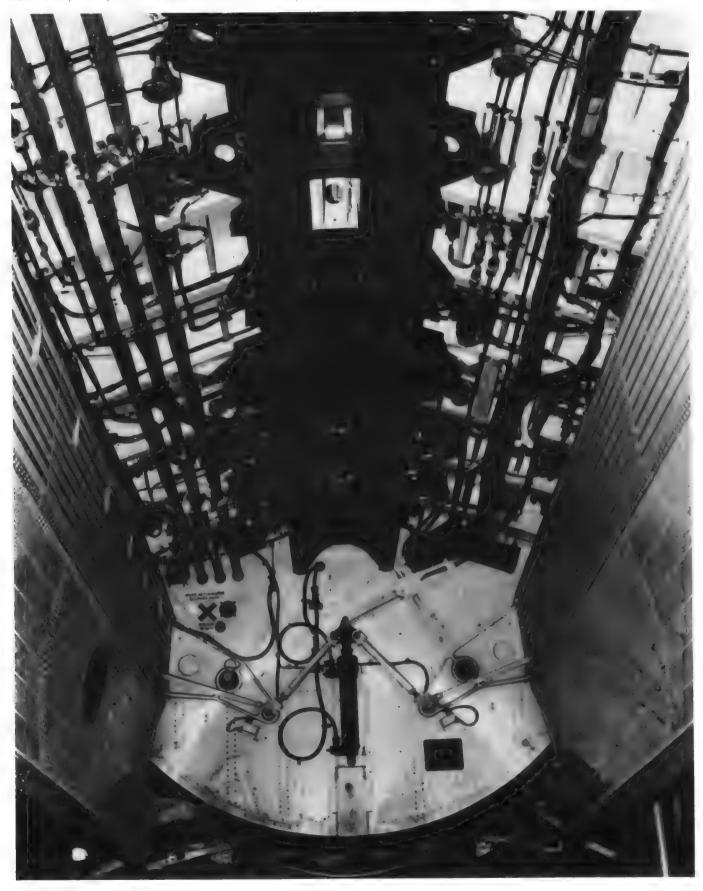


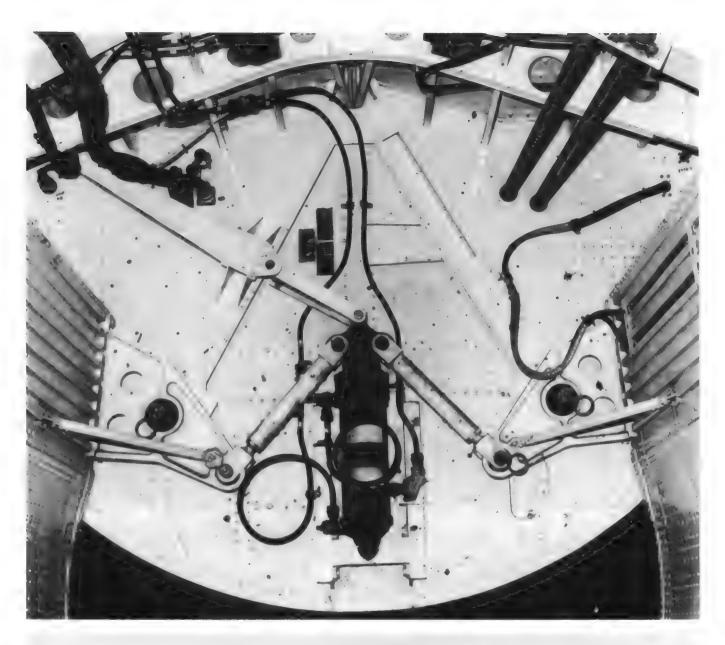


WEAPONS & STORES

Below: The Canberra's bomb bay could accommodate up to six 1000lb bombs, with two 4000lb or a single 5000lb weapon as alternatives. Nowadays, in the training and target facilities roles in which they normally operate, the aircraft use the bay mainly for an overload fuel tank and/or a pannier.

This view is of a B.2T, looking forward. Paint finish is white. Opposite page top: Rear bomb bay bulkhead, B.2T. Opposite page bottom: Wing tips can carry 250gal, jettisonable fuel tanks. The filling cap can be made out forward, in the centre of the black panel.









Page 28



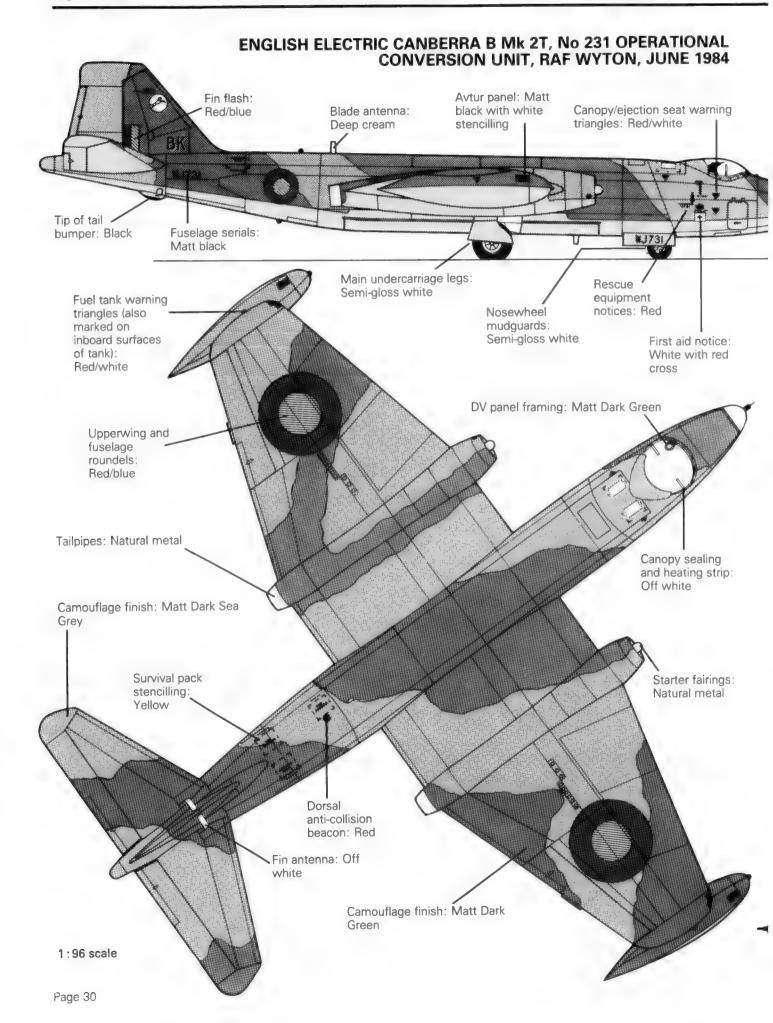
Opposite page: Five detail views of the wingtip tank. Note the sharp upper contours aft of the wing trailing edge, the navigation light at the forward extremity, the rib along the top edge forward, the warning triangles (red and white), and the four vortex generators to promote smooth airflow at the

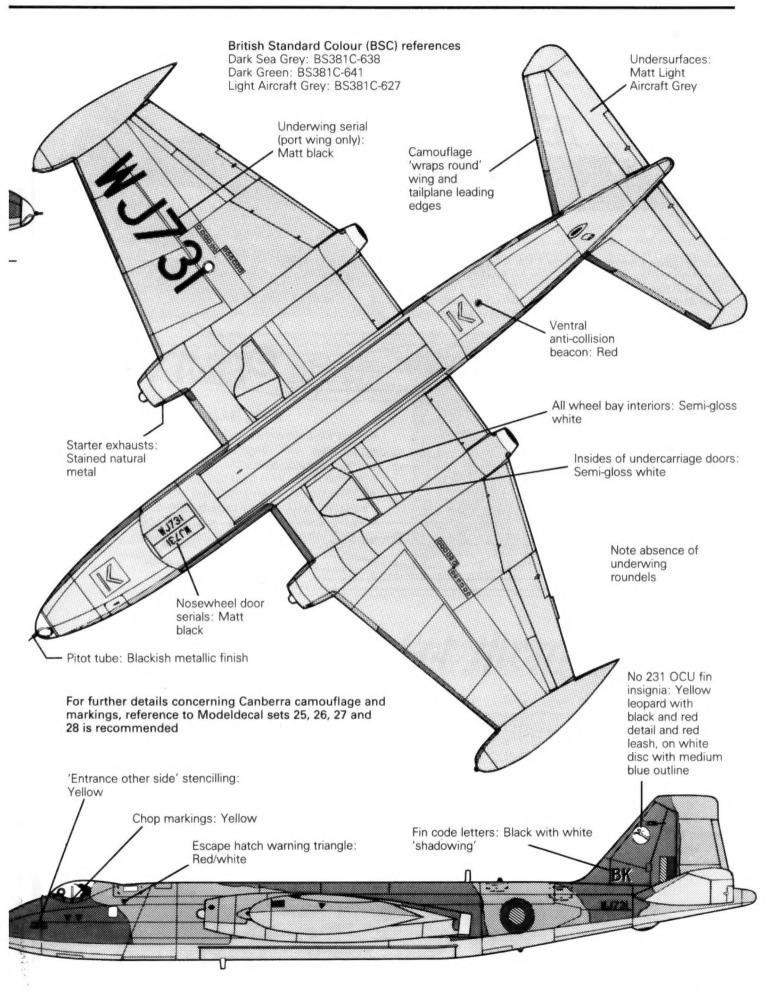
Inboard wing junction.

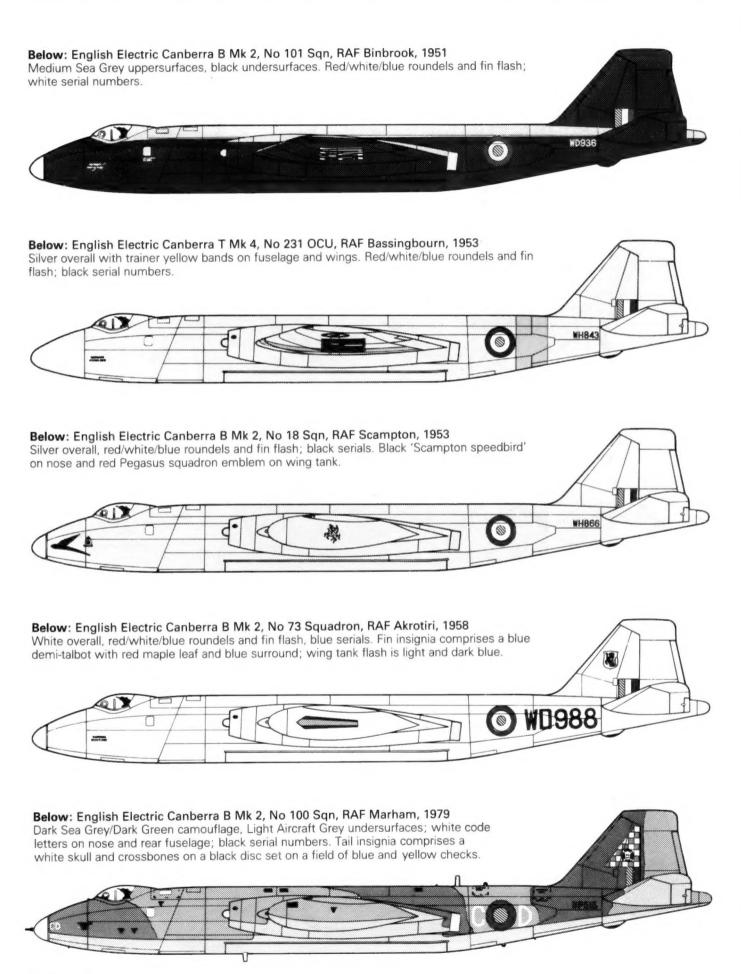
This page: Two photographs showing the Rushton gear fitted on the underwing pylons of the target-towing Canberra TT Mk 18s, operated by No 100 Squadron. Gear and pylon are yellow overall, the pylon having a black leading edge



SCALE COLOUR PLANS







NEW FOR '85!



HUNTER

Aeroquide 9:

Hawker Hunter F Mk 6/T Mk 7

Rightly regarded as the most elegant of all British postwar aircraft, the Hunter is now approaching the end of its RAF service career, although it is still operated by many other air forces the world over. This volume concentrates on the F.6 operated by the last RAF unit to fly the type, No 79 Sqn at Brawdy, with additional material illustrating the two-seat T.7. All the usual close-up details, plus comprehensive colour plans.

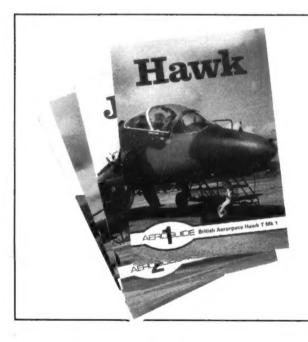
SEA KING

Aeroguide 10:

Westland Sea King HAR Mk 3

For the first time, an Aeroguide turns its attention to a helicopter - the world-famous Sea King. The particular variant under scrutiny is the rescue version operated by No 202 Sqn RAF, and coverage includes not only the familiar bright yellow HAR.3s but also the less well documented 'Grey Whales'. Full interior details are shown, together with schemes depicting rescue Sea Kings operated by other services.





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